

APR 30 1982

## Krummrich Industrial Waste (Monsanto) Landfill Site, Sauget, Illinois

Milt Clark  
Environmental and Human Health Specialist

Sandra S. Gardebring  
Acting Enforcement Counsel

THRU: Karl E. Bremer, Chief  
Toxic Substances Section  
Toxic Materials Branch

Introduction/Abstract

A comparative analysis is provided on chemicals (1) detected in seepages from the Krummrich Industrial Waste (Monsanto) Landfill site on the Mississippi River, (2) detected in monitoring wells at the same site, (3) reported by Monsanto to be disposed of in the same site, and (4) reported to be manufactured by the Krummrich Plant in the 1977 chemical inventory of the Toxic Substances Control Act (TSCA) and under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). The analysis reveals that there is substantial association between chemicals detected in seeps from the site by Illinois Environmental Protection Agency (IEPA) and Monsanto and those chemicals reported to have been disposed of at the Krummrich Landfill, manufactured by Monsanto, and found in monitoring wells. Taken in total, the strength of these associations leaves little doubt that the source of the seeps and the contamination of the Mississippi River bank is the Krummrich Industrial Waste Landfill site.

Analysis

As shown in the table "Chemical Data: Krummrich Plant and Disposal Site, Sauget, Illinois" (Attachment 1), of 26 specific compounds or classes of compounds detected by IEPA in seeps (Attachments 2, 3 and 4) emanating from the Krummrich Landfill, Monsanto reported disposing of 14 (54%) of these compounds or classes in the Krummrich Landfill in 1968 (Attachment 5). The association between chemicals found in seeps and those disposed of by Monsanto would be expected to be even more substantial if detailed knowledge were available on (1) specific compounds disposed (i.e., aromatic carboxylic acids), (2) wastes from production processes (i.e., sludge from alkyl benzene filtration), (3) wastes from research (i.e., miscellaneous solvents and materials), and (4) wastes placed in the Krummrich Landfill from the Monsanto plant located in St. Louis, Missouri. Eight compounds were detected in concentrations exceeding 10 ppm in one more of the seeps at the Krummrich Landfill. Five of these eight compounds were reported by Monsanto to have been the dominate chemicals landfilled at the Krummrich site (700 - 3,000 yard<sup>3</sup>). It would be expected that these particular chemicals would be present at much higher concentrations in the seeps, relative to the other chemicals detected. Two other compounds--2,4-D and

1160405

2,4,5-T--and their derivatives found above 10 ppm are known to have been produced at the Krummrich plant in Sauget. These chemical wastes may have been landfilled at the Krummrich site after 1968 or were unreported at that time. Chlorinated dioxins and dibenzofurans, which were also detected in seeps from the Krummrich Landfill by Monsanto and EPA, are widely recognized as contaminants of chlorophenolic chemical wastes such as those manufactured and landfilled by Monsanto in Sauget.

With the exception of nitroaniline, chemicals (86%) disposed of at the Krummrich site in excess of 700 cubic yards were present in one or more of the samples analyzed by Monsanto and IEPA. This high degree of association provides particularly strong and convincing evidence that the source of the seeps is the Krummrich Landfill. Further support for this conclusion is provided from Monsanto's chemical production records, from TSCA and from FIFRA. Fifteen (58%) of the 26 chemicals detected in the seeps by IEPA and EPA are produced or are known by-products (i.e., chlorinated dioxins and dibenzofurans) of the Krummrich plant. Using Monsanto's data on seeps, nine (75%) of the 12 chemicals found in seeps have been produced at the Krummrich plant. In addition, all four chemicals discovered by IEPA in monitoring wells at the Krummrich Landfill were also present in seeps emanating from the site (Attachment 6).

### Conclusion

Taken together, these associations provide strong evidence that the Krummrich Landfill is the source of the seeps found on the Mississippi River bank immediately below the landfill site.

### Attachments

cc: Bartelt  
Fenner  
O'Toole  
Holoska  
✓ Daggett

## CHEMICAL DATA: KRUMMRICH PLANT AND DISPOSAL SITE, SAUGET, ILLINOIS

SEEP ANALYSIS			MONITORING WELLS	DISPOSAL	MANUFACTUR
IEPA	Monsanto	EPA	IEPA	MONSANTO	MONSANTO
PCB	X				X
Toluene					
Chlorobenzene	X			X (1,100 yd <sup>3</sup> )	X
Dichlorobenzene	X		X		X
Chloroaniline*	X			X (1,100 yd <sup>3</sup> )	X
Chloronitrobenzene*	X			X (1,700 yd <sup>3</sup> )	X
Dichloronitrobenzene					X
Chlorophenol*	X		X	X (>720 yd <sup>3</sup> )	X
Dichlorophenol*	X			X (3,000 yd <sup>3</sup> )	X
2,4-D/2,4-D-Isomers*	X				X
2,5,-T/Similar Chemical*					X
Aniline	X				
Dichloroaniline	X			X (aniline derivatives)	
Chloronitroaniline				X (aniline derivatives)	X
Nitroaniline				X (1,700 yd <sup>3</sup> )	X
Phenol*	X			X (1,000 yd <sup>3</sup> )	
Nitrophenol					
Methyl phenol					
Diphenyl diol	X		X		
Diphenyl-2-ol					
Benzoic compounds*				X	X
4-methyl-2-pentenol				X (aliphatic alcohols)	
2-methylcyclopentanol				X (aliphatic alcohols)	
Benzene sulfonamide				X (sulfonated aromatics)	
Chlorotoluene			X		X
Dioxins/dibenzofurans	X	X		X (byproduct)	X (byproduct)

\*Concentrations &gt;10 ppm in seeps (IEPA data)

Time Collected: \_\_\_\_\_

Lab #

0022689

Date Collected: 10/2/81

SPECIAL ANALYSIS FORM

Date Received

OCT 5 1981

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY  
DIVISION OF LAND/NOISE POLLUTION CONTROL

COUNTY:

St. Clair

FILE HEADING:

Sweet / Dump (Toxic)

FILE NUMBER:

General

SOURCE OF SAMPLE: (Exact Location)

C - water sample collected from  
leachate seep down gradient from where B was collected, also  
along river bank ~ 20 ft from river's edge.

PHYSICAL OBSERVATIONS, REMARKS:

sampled liquid was relatively colorless,  
strong organic odor.

TESTS REQUESTED:

quantitative analyses for chlorophenols, chlorobenzenes,  
chlorotoluenes, 2,4,5-T; identify any other compounds; WADWing  
sample may contain D/DXIX

COLLECTED BY:

G. L. Mann

CLPC- TRANSPORTED BY:

RUSA

## LABORATORY

RECEIVED BY:

BT

DATE

COMPLETED:

11/23/81

DATE

FORWARDED:

11/23/81PCBs = 2.6 ug/l (ppb)Toluene = 150. ug/l2,4D = 7,800 ug/lChlorobenzene = 1600 ug/l2,4-D isomer or very similar  
compound = 29,000 ug/l4-Methyl-2-pentanone = 180 ug/lChlorophenol = 27,000 ug/lDichlorobenzene = 250 ug/lphenol = 12,000 ug/lChloroaniline = 38,000 ug/lMethylphenol = 110 ug/lDichlorophenol = 2100 ug/lMethylbenzenesulfonamide =Chloromethylphenol = 30 ug/lChloronitrobenzene = 820 ug/l2,4,5-T isomer or very similar  
compound = 6500 ug/lDichloronitrobenzene = 790 ug/l2,4,5-T < 200 ug/lDichloroaniline = 2800 ug/lBenzoic acid/derivative = 200 ug/lBiphenyl-2-ol = 280 ug/lBenzenedicarboxylic acid/derivative  
= 360 ug/l

LPC 44 4/77

(NOT FOR DATA PROCESSING)

0022689

Time Collected: \_\_\_\_\_

Lab # **DC22688**Date Collected: 10/2/81

SPECIAL ANALYSIS FORM

Date Received OCT 5 1981ILLINOIS ENVIRONMENTAL PROTECTION AGENCY  
DIVISION OF LAND/NOISE POLLUTION CONTROL

COUNTY:

Sf. Clair

FILE HEADING:

Source / Dump (Toxic)

FILE NUMBER:

Seven

SOURCE OF SAMPLE: (Exact Location)

B - water sample collected from  
leachate seep down gradient from where A was collected;  
also along the River Bank  $\approx$  50 ft from river's edge

PHYSICAL OBSERVATIONS, REMARKS:

sampled liquid was relatively colorless  
strong organic odor

TESTS REQUESTED:

quantitative analyses for chlorophenols, chlorobenzenes  
chlorotoluene, 2,4,5-T; identify any other constituents; WAPNII.  
sample may contain DIOXINS (RUSH)

COLLECTED BY:

D.C. Mann D.H.C.

TRANSPORTED BY:

## LABORATORY

RECEIVED BY:

B.H.DATE  
COMPLETED:11/23/81DATE  
FORWARDED:11/23/81PCBa < 0.5  $\mu\text{g/l}$  (PPb)Toluene = 40  $\mu\text{g/l}$ Chlorobenzene = 390  $\mu\text{g/l}$ Chlorophenol = 30,000  $\mu\text{g/l}$ Chloroaniline = 22,000  $\mu\text{g/l}$ Dichlorophenol = 7200  $\mu\text{g/l}$ Chloronitrobenzene = 9600  $\mu\text{g/l}$ Dichloroaniline = 820  $\mu\text{g/l}$ Biphenyl-2-ol = 300  $\mu\text{g/l}$ 2,4D = 17,000  $\mu\text{g/l}$ 2,4-D isomer or very similar compound = 42,000  $\mu\text{g/l}$ 2,4,5-T < 200  $\mu\text{g/l}$ 2,4,5-T isomer or very similar compound = 12,000  $\mu\text{g/l}$ phenol = 17,000  $\mu\text{g/l}$ Methyl phenol = 220  $\mu\text{g/l}$ Methyl benzene sulfonamide = 2000  $\mu\text{g/l}$ Aniline = 120  $\mu\text{g/l}$ Dichloronitrobenzene = 590  $\mu\text{g/l}$ Benzene sulfonamide = 650  $\mu\text{g/l}$ Chloronitroaniline = 33  $\mu\text{g/l}$ Nitroaniline = 23  $\mu\text{g/l}$ Dichlorobenzene = 110  $\mu\text{g/l}$ Benzoic acid/derivative =6600  $\mu\text{g/l}$ 

IL 5320514

LPC HA 4/77

(NOT FOR DATA PROCESSING)

DC22688

Time Collected: 10/2/81Date Collected: 10/2/81

Lab #

D022687

Attachment 4

SPECIAL ANALYSIS FORM

Date Received

OCT 5 1981

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY  
DIVISION OF LAND/NOISE POLLUTION CONTROL

COUNTY:

St. Clair

FILE HEADING:

Sauget/Dump (Toxic)

FILE NUMBER:

General

SOURCE OF SAMPLE: (Exact Location)

A- water sample collected from  
leachate seep along <sup>East</sup> Mississippi River Bank ~ 30 ft. from  
river edge.

PHYSICAL OBSERVATIONS, REMARKS:

sample relatively colorless although  
some sediment is mixed with the sample; strong organic odor

TESTS REQUESTED:

quantitative analyses for chlorophenols, chlorobenzenes,  
chlorotoluenes; 2,4,5-T; identify any other constituents; WARNING:  
sample may contain NOXINS (PLUST)

COLLECTED BY:

C. Brown

DLPC

TRANSPORTED BY:

## LABORATORY

RECEIVED BY:

B.A.

DATE  
COMPLETED:

11/23/81

DATE  
FORWARDED:

11/23/81

PCBa &lt; 0.5 µg/l (ppb)

Chlorophenol = 15,000 µg/l

Toluene = 11 µg/l

phenol = 22,000 µg/l

Chlorobenzene = 160 µg/l

Methylphenol = 570 µg/l

Chloroaniline = 24,000 µg/l

Dichlorophenol = 32,000 µg/l

Chloronitrobenzene = 21,000 µg/l

Nitrophenol = 600 µg/l

2,4D = 16,000 µg/l

Biphenyl diol = 1700 µg/l

2,4-D isomer or very similar compound = 38,000 µg/l

2,4,5T = 200 µg/l

Aniline = 550 µg/l

2,4,5-T or very similar compound = 10,000 µg/l

Dichloronitrobenzene = 740 µg/l

Methylbenzene sulfonamide = 15 µg/l

Dichloroaniline = 870 µg/l

4-methyl-2-pentanol = 26 µg/l

Chloronitroaniline = 84 µg/l

2-Methylcyclopentanol = 93 µg/l

Nitroaniline = 100 µg/l

Biphenyl-2-ol = 300 µg/l

Benzoic acid/derivative = 12,000 µg/l

Benzene sulfonamide = 75 µg/l

and Benzene-chloroacetic acid/derivative = 2500 µg/l

IL 532-0314  
PC BA 4/77The following acids or their derivatives were also  
detected.

(NOT FOR DATA PROCESSING)

D022687

Monsanto  
C O M P A N Y

Attachment 5

Seuget, Illinois 62201  
(618) 271-5035

August 16, 1968

Mr. C. W. Klassen  
Technical Secretary  
State of Illinois Sanitary Water Board  
Springfield, Illinois 62706

Dear Mr. Klassen:

In reply to your letter of August 7, 1968, I have the following information which you need to set up a monitoring program for our industrial waste disposal site.

In general we deposit at this site those wastes which would add to the sludge load at the waste treatment plant or would dissolve in our wastewater and add to the phenol content, C.O.D. or color of the final effluent. Chemically, they fall into 6 main groups:

1. Phenols
2. Aromatic Nitro Compounds
3. Aromatic Amines and Nitro Amines (highly colored)
4. Chlorinated aromatic hydrocarbons
5. Aromatic and aliphatic Carboxylic acids
6. Condensation or reaction products of the above

A more detailed list of sources and quantities follows:

1. Still Residues - tars, condensation and decomposition products of doubtful composition but with some of the primary product remaining.

From the Distillation of:

Approx. Annual Amount

a. Phenol ✓	1,020 Cu. yds.
b. Chlorophenol ✓	720 Cu. yds.
c. Nitro-Aniline and similar compounds ✓	1,700 Cu. yds.
d. Chlorobenzol (Tri-Tetrachlor) ✓	130 Cu. yds.
e. Chloro aniline	1,100 Cu. yds.
f. Other aniline derivatives	200 Cu. yds.
g. Nitro benzene derivatives	100 Cu. yds.
h. Aromatic carboxylic acids (Maleic, Phthalic, etc.)	1,500 Cu. yds.
i. Chlorophenol Ether	350 Cu. yds.

August 16, 1968

## 2. By-Products -

a. Mixed isomers of nitrochlorobenzene	1,700 Cu. yds.
"      "      "      Dichlorophenol	3,000 Cu. yds.
b. Waste Maleic Anhydride	730 Cu. yds.
c. Waste Chlorobenzenes and Nitro- chlorobenzenes	120 Cu. yds.

## 3. Contaminated Water and Acids -

a. Water with varying amounts of phenols (0-15%)	7,200 Cu. yds.
b. Waste Sulfuric acid with chlorophenol present	1,500 Cu. yds.
c. Caustic Soda Solution with chlorophenol present	5,300 Cu. yds.

## 4. Waste Solvents -

a. Waste Methanol contaminated with Mercaptans	600 Cu. yds.
b. Waste Isopropanol - Water and chlorinated hydrocarbon	5,500 Cu. yds.
c. Research Waste: Miscellaneous Solvents and Materials	1,019 Cu. yds.
d. Oily Materials from Oil Additive Production	101 Cu. yds.

## 5. Filter Sludge -

a. Attapulugus Earth -Keisulguhr from Alkyl Benzene filtration	600 Cu. yds.
b. Lime Mud from nitro-aniline production..	1,000 Cu. yds.

6. Unwanted Samples and Waste resulting  
from taking samples -

a. Chlorophenols	72 Cu. yds.
b. Laboratory Samples (Everything)	208 Cu. yds.

CO 1000

August 16, 1968

7. Miscellaneous Wastes -

These consist of spoiled material, floor sweepings, sludge from cleaning equipment and storage tanks etc which would cause problems if sewered. They are mostly reaction products of the above materials eg Esters of phenols or aliphatic alcohols with carboxylic acids such as phthallic, Maleic, or Benzoic acid, Anilides, Sulphonated phenols or other aromatics.

The relative quantities of these materials will necessarily vary according to sales of particular products and there will be additions to and deletions from this list. However, the general chemical classification will remain much the same.

Please let me know if you need any additional information.

Very truly yours,

J. R. McClain  
Plant Manager

jo.

G1954  
 (1) Time Collected: 10/13/79  
 Date Collected: 10/13/79  
 Date Received: 8/12/80  
 Lab # 283  
 SPECIAL ANALYSIS FORM  
 Check on quantitative  
 D.W. GT

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY  
 DIVISION OF LAND/NOISE POLLUTION CONTROL

COUNTY:

St. Clair

FILE HEADING:

Sanjet/Toxic Dump

FILE NUMBER:

16312103

SOURCE OF SAMPLE: (Exact Location)

G195 well located on east boundary at the center  
 at the site. well is 35' deep

PHYSICAL OBSERVATIONS, REMARKS:

dark gray color strong organic  
 chemical odor.

TESTS REQUESTED: CHECK FOR PRESENCE OF CHEMICALS LISTED IN  
 THE 9-16-69 AND 11-27-77 LETTERS FROM MONSANTO

Q.C. Mann <sup>K. Mensink</sup> ~~DLPC~~ DLPC

COLLECTED BY:

TRANSPORTED BY:

KEN MENSINK DLPC

LABORATORY

RECEIVED BY:

GP

DATE  
COMPLETED:

DATE

FORWARDED: 8/12/80

K. Mensink

Chlorophenol, dichlorobenzene,  
 diphenylether, chlorotoluene, alkylphenols  
 and aliphatic hydrocarbons are present  
 in this sample.

Chlorophenol = 810  $\mu\text{g/l}$  (PPb)Dichlorobenzene = 1600  $\mu\text{g/l}$ Chlorotoluene = 18,000  $\mu\text{g/l}$ Diphenylether = 2100  $\mu\text{g/l}$ 

RECEIVED

AUG 12 1980

E.P.A. - D.L.P.C.  
STATE OF ILLINOIS